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## **INSPECTION AND ACCEPTANCE PRECAST AND PRESTRESSED CONCRETE BRIDGE UNITS**

### **GENERAL**

The purpose of this Instructional Memorandum is to set forth the minimum requirements of the fabricator's quality control program and to provide general guidelines for the inspection of precast/prestressed concrete bridge units.

### **SCOPE**

To ensure that all work performed will be in accordance with the contract documents by establishing management commitment to Quality Control, with trained qualified personnel and uniform production procedures.

### **FABRICATOR APPROVAL**

In order to furnish precast/prestressed bridge units to projects administered by the Iowa Department of Transportation, the fabricator shall be placed on the approved producer/fabricator list ([Appendix A](#)).

1. Each fabricator must submit a written application to the respective District Materials Engineer (DME). This application shall detail the fabricator's Quality Control Program. Note: Fabricators with operations in more than one District shall apply to the appropriate DME for each site. (A sample application is attached to this I.M.)
2. Each fabricator/producer shall have a plant specific Quality Control Procedure Manual modeled and detailed in accordance with the "Guide Lines" for the fabrication of Precast/Prestressed bridge units intended for use on state, county and/or city projects.

Guidelines of Quality control for the fabrication of precast/prestressed bridge units are listed in [appendix "F"](#): of this I.M.

These "Guidelines" are considered the Principal Factors in Quality Control and are the basis upon which each Plant Specific Procedure manual will be accepted and/or rejected. The Plant Specific Procedure Manual shall detail fabrication procedures such as but not limited to: Description of production lines, calculation procedure, tensioning procedures, concrete mixtures, approved mix designs, concrete placement and consolidation, detensioning procedures, curing procedures, repair and finishing procedures, handling, storage and shipping procedures. A sample of the forms used by the fabricator to document plant quality control inspection shall be approved by the DME and be included in the Manual. A copy of this Manual shall be submitted to the Iowa Department of Transportation for approval by the DME and the Structural Material Engineer.

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3. The fabricator shall have a sufficient number of qualified, capable personnel to perform the necessary quality control functions. This includes, but is not limited to, activities such as ensuring proper placement of steel reinforcement, placement and tensioning of strand, material identification and handling, concrete proportioning, mixing and consolidation, fabrication, marking, curing, and documentation. The Quality Control personnel shall be responsible for all phases of fabrication, for units being produced for state, county, and/or city projects.
  4. Safety: To assure safety, the fabricator shall have a safety policy, safety program, safety manual and a designated safety officer responsible for enforcing the safety rules. Additionally, each fabricator shall comply with all applicable laws, rules, regulations and ordinances governing safety. The fabricator shall make adequate provisions satisfactory to the DME for the safety of the inspector, particularly at all sampling, tensioning and inspection locations. Any violation of the Safety Laws, Rules or Regulations may be considered sufficient grounds by the DME for suspending all inspection activities.

### **QUALITY CONTROL PROGRAM**

The fabricator's written application shall detail the following:

1. A flowchart listing the chain of command to aid in problem solving and to facilitate communication between the Iowa DOT inspector and appropriate fabricator personnel. Included in the flowchart shall be a statement of management commitment to, and responsibility for, maintaining the Quality Control Program.
  - a. It is recommended that Quality Control inspections be performed by personnel other than those responsible for production and thus, reporting directly to management.
  - b. Deviations from the established flowchart, in personnel that will affect the Quality Control Program, require prior approval from the DME (i.e., situations involving the temporary absence of personnel normally responsible for quality control inspection).
2. A statement that the fabricator will maintain qualified (certified) personnel.
3. Designate how specification requirements are relayed to the responsible quality control personnel and which company representative is responsible for this task.
4. A statement that the approved plant specific procedural manual will be adhered to, maintained, and updated as needed.

### **CONDITIONAL STATUS**

Non-compliance of the fabricator written Quality Control Program will constitute grounds for the DME to place the fabricator on conditional status. The DME will document and submit a written notice to the fabricator identifying the areas of noncompliance. Continued non-compliance will be considered grounds to remove the producer from the approved list.

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Conditional status may be rescinded by the DME if the fabricator provides a written description of corrective measures taken to resolve the issue(s) to the DME. An appeal may be made to the Review Board if the fabricator wishes to contest the conditional status. The Review Board will meet as needed for disciplinary actions and appeals involving approved producers.

Iowa DOT inspection of fabrication will be suspended until the conditional status is rescinded by the DME or the Review Board resolves the issue(s). Products manufactured during the suspension will not be approved for use on projects.

The Review Board will consist of the Iowa DOT Materials Engineer, the Iowa DOT Structural Materials Engineer, and the Chief Structural Design Engineer.

Failure to remedy the issues that constituted the conditional status, or repeated placement on conditional status (three instances during a three-year period) will require an automatic review by the Review Board to consider disciplinary measures. Willful misrepresentation by the fabricator or intentional shipment of nonapproved products shall also be grounds for removal from the approved fabricator list.

Any fabricator removed from the list may be considered for reinstatement by reapplying to the appropriate DME and the Review Board.

### **CERTIFIED PRECAST/PRESTRESSED PERSONNEL**

The Iowa DOT Office of Materials shall certify inspectors and Quality Control Technicians responsible for the inspection of precast/prestressed concrete bridge units.

Certification requirements are as follows:

1. Experience of forty hours assisting in quality control inspection at an approved plant. **NOTE:** The required forty hours must be approved by the DME.
2. Successful completion of the Iowa DOT training course (a score of at least 80% on the written test).

Certification will be valid for a five-year period, after which the technician will retest to maintain certification.

### **CERTIFICATION**

Upon successfully completing the requirements for certification, the Program Director will issue a certificate and a pocket certification card. This certification is not transferable.

### **PERFORMANCE REQUIREMENTS**

A written notice may be issued to the certified technician for any inadequacies performed during their duties. Upon receipt of two such notices, the certified technician may be given a three-month suspension. After three written notices, the certified technician is subject to decertification.

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## **DECERTIFICATION**

The certificate will become invalid for reasons such as:

1. Failure of the certificate holder to renew the certificate prior to regular expiration described above.
2. False or fraudulent use of information to secure or renew the certificate.
3. False or fraudulent actions or documentation by the certificate holder.
4. Not performing tests and technicians duties properly and in accordance to specification.

## **RENEWAL OF CERTIFICATION**

Certifications will remain valid for five years (a three-month grace period will be allowed). If the individual has not renewed their certification within the 90-day grace period, she/he will be automatically decertified. The individual may obtain certification by taking the examination. If the individual does not take the examination within one year from the date of decertification, he/she must retake all applicable schools and pass the examinations. **The responsibility for applying for recertification shall rest with the certified individual.**

It shall be the responsibility of the individual to inform the Office of Materials of any address change.

Retesting will be required every five years regardless of work experience or performance. Failure of any certification test shall require the applicant to retake the applicable school and pass the test.

Detailed information on certification, de-certification, and re-certification is located in I.M. 213.

## **PREFABRICATION MEETING**

The fabricator shall initiate this meeting prior to the commencement of any fabrication. Representatives of both the fabricating plant and the DOT shall attend this meeting.

Items to be discussed are:

Production schedule  
Applicable specifications, I.M.s, shop drawings, and design standards  
Approved mix designs  
Methods of testing and curing  
Materials testing, acceptance, and approval  
Material storage and handling  
Quality Control Program and certification requirements  
Fabrication errors, discrepancies, and repair methods  
Acceptance and approval of final products  
Methods of measuring camber  
Cylinder strength requirements  
Final inspection and camber reading  
Shipping procedure and protection  
Documentation of the prefabrication meeting

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Combined pours with altered strand design patterns or with multiple size differentials must have prior approval of the contracting authority, and shall be in compliance with the requirements and provisions of [Appendix E](#).

By mutual agreement, periodic scheduled meetings between the fabricator and the District Materials Engineer may be used in lieu of the prefabrication meeting.

### **MATERIALS APPROVAL, CERTIFICATIONS, AND SAMPLING FREQUENCY**

All materials for use in precast/prestressed concrete fabrication shall meet the requirements of the standard specifications and the I.M.s.

**Cement** - Cement shall be from an approved source and shall meet the requirements of Section [4101](#) of the Standard Specifications. Monitor samples shall be at the rate of one sample per month per supplier.

**Fly Ash** - Fly Ash shall be from an approved source and shall meet the requirements of Section [4108](#) of the Standard Specifications. Monitor samples shall be at the rate of one sample per month per supplier.

**Fine Aggregate** - Fine Aggregate shall be from an approved source and shall meet the requirements of Section [4110](#) of the Standard Specifications. The fabricator shall perform certified gradation testing at a minimum frequency of one test per week per source.

**Coarse Aggregate** - Coarse Aggregate shall meet the requirements of Section [4115](#) of the Standard Specifications, and shall be Class III durability aggregate. The fabricator shall perform certified gradation testing at a minimum frequency of one test per week per source.

**Admixtures** - Admixtures shall be from an approved source and shall meet the requirements of Section [4103](#) of the Standard Specifications.

**Strand for Prestressing** - Strand for prestressing shall be from a domestic source and shall be the size, grade, and type specified in the contract documents. The fabricator shall provide certified mill test reports and load-elongation curves. Prestressed strand may be accepted by certification, and monitored by sampling and testing at the rate of one sample per heat. Sample size is 2 m (6 ft.) length of strand with copies of certified mill test reports. All strands shall be free of contamination (dirt, mud, oil, paint, wax, etc.) that may prevent bonding between the strands and the concrete. Strands shall be free from nicks, kinks, and excessive rust. Rusting is generally acceptable if the rust is light and if pitting is not evident. Strand shall conform to the requirements of AASHTO M203 M (ASTM A416 M) seven-wire prestressing strand.

**Wire Failure-Prestressing strands**-During stressing of seven-wire prestressing strands for a single beam or one line of beams cast with a common strands, the number of individual wire failure shall not exceed 2% of the total number of wires. The permissible number of wire failure shall be rounded to the next lowest whole number. No individual strand shall have more than one wire failure.

**Example:** LXD 100, No. of 7-wire strands = 36, total number of wires = 252, 2% of total number of wires=5.04, max allowable No. of strands with one wire failure = 5.

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**Reinforcement** - Steel reinforcement for precasting/prestressing shall be from an approved source and shall be accompanied by a mill test certification and shall comply with the requirements of Section [4151.03](#) of the Standard Specifications. Monitor sampling will be done at a minimum rate of one sample of the most common bar per manufacturer per year. Rusting is generally acceptable if the rust is light and if pitting is not evident.

**Sole Plates, Steel and Masonry Curved Sole Plates** - Acceptance shall be on the basis of approved shop drawings, acceptable workmanship, and fabrication inspection reports which shall include mill certification, type and steel grade, and galvanizing checks. ASTM A-852, Grade 70 is required. ASTM A-514, Grade B or ASTM A-709, Grade 70W structural steel may be substituted for ASTM A-852, Grade 70.

**Protection Plates:** Acceptance shall be on the basis of approved shop drawings, and acceptable workmanship. Protection plates can be used at the discretion of the producer/fabricator. Protection Plates shall be made of ASTM A-36 and shall be fully galvanized in accordance with the requirements of ASTM A-153 class B.

**Neoprene Bearing Pads** - Neoprene bearing pads will be accepted from an approved manufacturer on the basis of certification with monitor sampling and testing in accordance with I.M. 495 and Article [4195.02](#) of the Standard Specifications.

**Coil Ties and Holddowns** - Will be sampled once per year per size.

**Water** - Water shall meet the requirements of Article [4102.01](#). Will be sampled once per year.

A copy of reports of approved materials, cement certifications, mill test reports for steel reinforcement, etc., shall be kept on file by the fabricator and be available for examination by the engineer for one calendar year after the prestressed units are incorporated into a project.

#### **EQUIPMENT AND PLANT APPROVAL**

A registered Professional Engineer shall designate casting beds and equipment. Annual safety inspection to verify the adequacy of the bed(s) (vertical movement) shall be performed and documented by the producer. A copy of the safety inspection shall be submitted to the State upon request. Calculation shall be submitted to the Iowa Department of Transportation should there be any anticipated change(s) in the maximum intended loading.

Plan dimensions and specification values are to be considered as the target value to strive for and comply with as the design value from which deviations (within tolerances) are allowed. If any plan or specification changes are implemented, then the revised values shall govern.

Casting beds, forms and bulkheads shall meet the requirements of Article [2407.04](#) of the Standard Specifications. Casting beds shall be checked for line and grade at a frequency of at least once per year or as often as necessary. This check shall be performed and documented by the fabricator. Casting beds, forms, and bulkheads that are not mortar tight shall be sealed or repaired prior to reuse.

Weighing and proportioning equipment shall meet the requirements of Article [2001.20](#) of the Standard Specifications except that a vibrator will not be required on the cement batch hopper. Batching and proportioning equipment and scales shall be calibrated at least once a year. The Engineer may order a verification calibration test or check as necessary to ensure continued compliance.

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Mixing equipment shall meet the requirements of Article [2001.21](#) of the Standard Specifications.

Stressing equipment shall be in accordance with Article [2407.04C](#) of the Standard Specifications and shall be calibrated at a frequency of at least once per year or when is determined necessary. Calibration of the jacking system shall compare the indicated force applied by the system, to the force indicated on a calibrated load cell, dynamometer, or proving ring.

When artificial heat is used to obtain temperatures above 38°C (100°F), the temperature of the interior of the concrete shall be recorded by a system meeting the requirements of Article [2407.10](#) of the Standard Specifications.

Concrete temperature shall be uniform throughout the curing process and shall not vary by more than 22°C (40°F) through the entire casting bed. Temperature probe locations shall be randomly located within ? length of the line (each line).

Automatic moisture measuring equipment for aggregate shall comply with the requirements of [I.M. 527](#).

Testing equipment shall have sufficient capacity for the testing involved. Cylinder breaking equipment shall be calibrated at a minimum frequency of once per year.

Jack Calibration/Tensioning Equipment Calibration shall be performed by an independent certified approved laboratory and witnessed by Iowa DOT.

Plant Calibration shall be performed once a year and/or as needed by an independent certified approved laboratory and witnessed by Iowa DOT.

### **DOT INSPECTOR KNOWLEDGE AND DUTIES**

The inspector's main functions are to monitor production, report findings and assist in quality improvement wherever possible. This is done to ensure that the Quality Control Program provided by the fabricator is functioning and is adequate to produce acceptable products.

The inspector is the liaison between the contracting authority and the fabricator. Good communications are important to maintain a good working relationship between the inspector and fabricator.

The inspector should be familiar with Standard Specification Article [1105.07](#), which describes the authority and duties of the inspector. He/she will not direct the fabricator's activities, but will have the authority and responsibility to question and, where necessary, reject any operation not in accordance with contract documents.

There are many phases included in the process of fabricating precast prestressed concrete products.

While all phases are important to the overall quality of the product, there are several that the Agency inspector should make every effort to personally witness or perform:

Verify tensioning calculations and tensioning production records as soon as possible after tensioning.

Visually inspecting the product as soon as possible after casting.

Approve repairs.

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Provide final inspection after repair and finish work is completed including excessive lateral sweep.

Review fabricator's documentation and prepare fabrication report.

The remaining phases shall be monitored by an Iowa D.O.T. inspector as needed (as deemed necessary by the District Materials Engineer).

Location of hold-ups and hold-downs, strand pattern, bed condition.

Placement of end plates, trueness of forms, insert type and location.

Tensioning operations.

Steel reinforcement and placement.

Concrete placement, making strength specimens, concrete operations.

Curing operation.

Compressive strength determination.

Detensioning operations.

Camber at release.

Finishing and repair operations.

Storage of units.

Loading and transporting. (Overhang requirements; padding is required if chains are used for tie-downs.)

### **MINIMUM QUALITY CONTROL DUTIES BY THE FABRICATOR**

The Quality Control Technician shall check and document the following:

#### **PRE-POUR**

Identify and document materials requiring outside fabrication inspection.

Identify potential fabrication or production problems and notify Iowa DOT inspectors.

Verify that all materials incorporated meet the requirements of the contract documents.

Review concrete placement documents for strand locations.

Check tension calculations.

Measure elongation and gauge pressure during tensioning (see [Appendix C](#)).

Check hold down and insert locations.

Check stress distributions.

Check steel placement.

Check strand position.

Check condition of pallet (level, holes, gaps, and other deformities).

Determine moisture of aggregates.

Check form condition and placement (oil, line alignment level, and tightness)

#### **CONCRETE PLACEMENT**

Check on use of an approved mix design and batching operations (sequence)

Ensure appropriate placement and proper vibration techniques

Measure and record concrete temperature

Ensure test cylinders are properly made

Ensure appropriate finish

Ensure appropriate curing operations

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## POST-POUR

Check temperature and record during curing process.  
Ensure concrete strength has been met prior to releasing the line.  
Ensure proper detensioning procedure.  
Check unit for defects and obtain approval for repairs.  
Identify and store cylinders with the respective units.  
Check beam ends for fabrication in accordance with the plans.  
Ensure exterior sides of fascia beams are grouted.  
Measure and record overall dimensions of beam.  
Measure and record camber at release and compare to design camber. (See camber measurement procedures on page 11)  
Check and/or measure and record lateral sweep before shipping. (For sweep correction, refer to page 11 of this I.M.)  
Ensure proper cylinder cure (cylinders must remain moist throughout the entire cure process and until testing).

## **CONCRETE STRENGTH**

1. For release strength, see the requirements of Article [2407.03](#) of the Standard Specifications and/or as indicated on the plans.
2. For 28-day strength, see the requirements of Article [2407.03](#) of the Standard Specifications and/or as indicated on the plans.
3. Prestress units cannot be shipped until the 28-day strength is attained.
4. Beams must be at least 28 days old before the floor is placed, unless a shorter curing time is pre-approved by the engineer.

## **REPAIR, FINISH, HANDLING & STORAGE**

Honeycomb and surface defects (Exterior and interior beams) shall be filled and finished in accordance with the requirements of Article [2407.14](#) of the specifications. Bugholes smaller than 12.7 mm (1/2") in diameter need not to be filled unless it's in a concentrated form. **Note: For definition of Honeycomb, Bugholes and surface defects please refer to [Appendix G](#) of this I.M.**

Handling and storage shall be done in accordance with the requirements of Article [2407.13](#) of the Standard Specifications.

Each unit must have legible identification (displayed on the web). Identification shall include the following: producer's name, beam number, fabrication date and fascia girder identification.

The top of the beam shall have a tined finish with an approximate two-inch wide smooth finish on the top edge (one side only) of the beam.

The stenciled word "EXTERIOR" shall be printed in "Red Color" at each end of the exterior face of the fascia girder. The stenciled letters of the word "EXTERIOR" shall be three (3) inches in height and be visible.

Prestressed/Precast units shall be free from honeycomb, surface defects, surface voids, bug holes and oil stain. Bug holes can be accepted if they are less than 1/2" in diameter (as measured by a DOT template) and not in a concentrated form (shot gun appearance).

The outer surface of "Exterior Girders" shall have a surface finish in accordance with the requirement of Article [2407.14](#) of the standard specifications. The finished surfaces shall be free of surface defects, oil stain and shall have a uniform color.

When required by the plans, beam-ends shall be coated and sealed at the prestressed fabrication plant with an approved gray or clear epoxy listed in I.M. 491.12, Appendix A.

Prestressed/Precast units shall be stamped and accepted by the Q.A. inspector prior to shipping.

The overhang shall not exceed 5 percent of the length of the beam and/or as indicated in the following table:

For LXD beams over 28.96 m (95 feet) in length, use the following table as specification limitations on shipping overhang:

Beam	Required Minimum Strength at Shipping (PSI)	Maximum Overhang Length in Feet
LXD 100	7500	12
"	6000*	9
LXD 105	7500	12
"	7000	10
"	6000*	5
LXD 110	7500	14
"	7000*	12
LXD 115	7500*	14
LXD120	7500*	14

\*Plan specified minimum 28-day compressive strength.

Please note, as indicated, the table includes the maximum shipping overhang for the longer LXD beams, which are not specified in the notes on standard LXD beam detail sheets. Also please note, this table applies to standard beams using standard strand patterns. The Office of Bridges shall review all nonstandard beams and Structures to determine the maximum allowable shipping overhang. The standard LXD beam sheets will be revised to include all of this information.

The concrete strength shall be determined by the appropriate cylinder test or any other approved methods. The concrete strength required for some shipping overhangs may exceed the plan-specified minimum 28-day concrete compressive strengths.

### **CAMBER MEASUREMENT PROCEDURE**

Camber due to Prestress shall be measured while the beam is on the bed by checking the beam profile immediately (within three hours) after detensioning and separation of the beam.

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Camber shall be measured from the pallet to the bottom of the beam at mid-point utilizing a conventional tape measure. Camber shall be measured and recorded to the nearest 1/8 inch. Beam shall be resting free on the pallet at the time of the camber measurement. Camber acceptance shall be achieved within 48-hours of dentensioning and separation.

Non-complying camber of any beam shall be verified at a later date. Beams cannot be accepted without a complying camber without specific approval of the engineer.

### **SWEEP/EXCESSIVE SWEEP HANDLING PROCEDURES**

The following procedures shall be followed in the event of pre-stressed concrete beams having developed sweep in excess of the allowable specification requirement tolerance of L/80. The procedures described in this section apply only to a uniform sweep with single lateral curvature producing a maximum offset at mid-point of the beam length.

- A. Beams with excessive sweep greater than L/80 (L) shall be corrected at the fabricator's plant prior to shipping to the project site.
- B. The fabricator may either tilt or lean the beam. This procedure will not require any prior approval.
- C. A force may be applied to induce a maximum corrective lateral deflection as outlined below:

<u>Beam Type and Size (English)</u>	<u>Sweep (inches)</u>
LXC 55 - LXC 80	L/80
LXD 80 - LXD 105	3L/160
LXD 110 - LXD 120	L/40
<u>Beam Type and Size (Metric)</u>	<u>Sweep (mm)</u>
C 17 M - C 24 M	L
D 24 M - D 32 M	1.5L
D 33 M - D 36 M	2L

This procedure will not require any prior approval. "L" is the entire beam length in feet (meters).

- D. If a force is to be applied other than what is outlined in paragraph "C", then this force needs to be predetermined and pre-approved by the Office of Bridges and Structures.
- E. If approved, the intended force indicator must be carefully applied and must be monitored by means of a dial or a digital gauge. The monitor inspector shall make sure that the applied force does not exceed the predetermined limits. If the force exceeds the predetermined limits, then the beam shall be rejected.
- F. The determination of sweep compliance shall be made no earlier than 48 hours and not until after the sweep correction techniques have been fully completed and the beam has been freed. The corrected beam must remain straight, in straight line parallel to the centerline of the beam and must comply with specification requirements L/80 (L). Beam shall be free. If the beam is checked on the bed, lifting and resetting shall be required.

- G. A beam with twisted upper flange or lower flange shall not be accepted.
- H. If approval is required for the jacking force, a written request shall be made to the District Materials Engineer. The District Materials Engineer will forward to the Office of Bridges and Structures for review and approval and with a copy to Central Materials.
- I. Sweep in prestressed beam shall be measured at the web mid-point utilizing a cotton or nylon string tied to beam ends with sufficient tension. A conventional tape measure or a ruler may be used to measure the sweep.

\*For further information, consult the "Sweep Correction/Conversion verification Table", listed on page 13 of this I.M.

### Sweep Correction

**CONVERSION VERIFICATION TABLE**

Beam ID	Length	Allowed Correction	Beam ID	Length	Allowed Correction
LXC 55	56.00	0.70 IN	C 17 M	17.300 M	17.3 MM
LXC 59	60.17	0.75 IN	C 18 M	18.800 M	18.8 MM
LXC 63	64.33	0.80 IN	C M	M	0.0 MM
LXC 67	68.50	0.86 IN	C 20 M	20.300 M	20.3 MM
LXC 71	72.67	0.91 IN	C 21 M	21.800 M	21.8 MM
LXC 75	76.83	0.96 IN	C 23 M	23.300 M	23.3 MM
LXC 80	81.00	1.01 IN	C 24 M	24.800 M	24.8 MM
LXD 80	81.00	1.52 IN	D 24 M	24.800 M	37.2 MM
LXD 85	86.00	1.61 IN	D 26 M	26.300 M	39.5 MM
LXD 90	91.00	1.71 IN	D 27 M	27.800 M	41.7 MM
LXD 95	96.00	1.80 IN	D 29 M	29.300 M	44.0 MM
LXD 100	101.00	1.89 IN	D 30 M	30.800 M	46.2 MM
LXD 105	106.00	1.99 IN	D 32 M	32.300 M	48.5 MM
LXD 110	111.00	2.78 IN	D 33 M	33.800 M	67.6 MM
LXD 115	116.00	2.90 IN	D 35 M	35.300 M	70.6 MM
LXD 120	121.00	3.03 IN	D 36 M	36.800 M	73.6 MM

### Sweep Correction - Field Procedures

For Beams that have developed sweep at the project site, a correction procedure may be applied to correct the sweep. A force may be applied to induce a maximum corrective lateral deflection within the following limits:

#### Beam Type and Size

LXC 55 - LXC 80 (C 17 M - D 32 M)  
LXD 80 - 105  
LXD 110 - 120 (D 33 M - D 36 M)

#### Maximum Allowed Correction \*

L/80 (L)  
(D 24 M - D 32 M) 3L/160 (1.5 L)  
L/40 (2 L)

L is the entire beam length in feet (meters).

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This procedure does not require prior approval, if the force to be applied does not exceed the predetermined limits provided in the above outline. The 48-hour monitoring period identified in paragraph F for the determination of sweep compliance shall not be required.

If the force to be applied is greater than the limits outlined above then the intended applied force shall be predetermined and preapproved by the Office of Bridges and Structures.

If approved, the intended force shall be carefully applied and shall be monitored by means of a dial indicator or a digital gauge. The monitor inspector shall make sure that the applied force does not exceed the predetermined limits. If the applied force exceeds the predetermined limits, then the beam shall be rejected.

The 48-hour waiting period requirements identified in paragraph "F" shall be required.

Sweep determination and acceptance at the project site shall be measured along a chord line at mid-point of the top flange. A conventional tape measure or a ruler may be used to measure the sweep.

\*For further information, consult the "Sweep Correction/Conversion verification table listed on page 13 of this I.M.

#### **DOCUMENTATION**

Production records shall include as a minimum, the following data for each precast or prestress unit:

- Approved mix used
- Tensioning calculation
- Elongation measurements and gauge pressure
- Air temperature, at time of concrete placement
- Concrete temperature
- Curing temperature
- Release and shipping cylinder strengths
- Release and 28 day or shipping camber
- Fabrication Approval date
- Dimensional check
- General appearance
- Repairs made
- Irregularities and remarks

**NOTE:** Final acceptance of the beams shall be at the project site by construction personnel.

#### **REPORTING**

The units are to be reported on Form #820905.

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**PRECAST AND PRESTRESSED CONCRETE BRIDGE UNITS  
FABRICATOR APPROVAL APPLICATION**

1. Has a current Plant Procedures Manual been approved by the DME? (Yes or no. If no, please explain.) \_\_\_\_\_  
\_\_\_\_\_
2. I agree to the following statements: Production operations will adhere to the Plant Procedures Manual. Updates and changes will be approved by the DME before use. (Yes or no. If no, please explain.) \_\_\_\_\_  
\_\_\_\_\_
3. Will Plant Quality Control forms be maintained during the course of production and be available for review by Iowa DOT personnel? (Yes or no. If no, please explain.) \_\_\_\_\_  
\_\_\_\_\_
4. Which company representative (position or name) will be responsible for distributing current, applicable specifications to production and quality control personnel? \_\_\_\_\_  
\_\_\_\_\_
4. Do quality control personnel inspect all phases of manufacturing (i.e., materials used, mixes, tensioning, pouring, curing, finishing, yardage and shipping)? (Yes or no. If no, please explain.) \_\_\_\_\_  
\_\_\_\_\_
6. Are the personnel responsible for quality control inspection Iowa DOT-certified? (Yes or no. If no, please explain.) \_\_\_\_\_  
\_\_\_\_\_
7. Please attach a flowchart of your company chain of command (See attached example.) including names, business addresses and phone numbers of appropriate management personnel to contact for problem resolution.

Indicate the District(s) for which you are seeking approval.

1                      2                      3                      4                      5                      6

Authorized Company Signature \_\_\_\_\_ Date \_\_\_\_\_

DME Recommendations \_\_\_\_\_  
\_\_\_\_\_

DME Signature \_\_\_\_\_ Date \_\_\_\_\_

Approval (Yes or No) Remarks \_\_\_\_\_  
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Materials Engineer Signature \_\_\_\_\_ Date \_\_\_\_\_

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